

WHAT IS CLAIMED IS:

- 1 1. A method for controlling at least one engine cooling fan for a
2 compression ignition internal combustion, the method comprising:
3 turning on the at least one cooling fan when an intake manifold air
4 temperature is equal to or greater than a predetermined turn-on threshold
5 temperature for a predetermined turn-on time; and
6 turning off the at least one cooling fan when the intake manifold air
7 temperature is equal to or less than a predetermined turn-off threshold temperature
8 for a predetermined turn-off time, wherein the predetermined turn-on threshold
9 temperature is greater than the predetermined turn-off threshold temperature.
- 1 2. The method of claim 1 further comprising determining the
2 predetermined turn-on time and the predetermined turn-off time via a look up table
3 and in response to the intake manifold air temperature.
- 1 3. The method of claim 1 further comprising turning off the at least
2 one cooling fan when an engine coolant temperature is below a predetermined
3 temperature.
- 1 4. The method of claim 3 further comprising turning off the at least
2 one cooling fan when both of the intake manifold air temperature and the engine
3 coolant temperature are equal to or less than respective predetermined temperatures
4 when the intake manifold air and engine coolant temperatures are independent of one
5 another.
- 1 5. The method of claim 1 further comprising turning on the at least
2 one cooling fan when a final torque generated by the engine is equal to or greater
3 than a predetermined value.
- 1 6. The method of claim 1 further comprising delaying turn-on of the
2 at least one fan when the engine is attempting to start or within 5 seconds after
3 starting.

1 7. The method of claim 1 further comprising determining the
2 predetermined turn-on time and the predetermined turn-off time using a counter.

1 8. The method of claim 1 further comprising turning on the at least
2 one fan when there is a fault in at least one sensor related to determination of the
3 intake manifold air temperature.

1 9. The method of claim 1 further comprising:
2 turning on a low speed one of the at least one fans when the air inlet
3 temperature is equal to or greater than a predetermined low turn-on threshold
4 temperature for a predetermined low turn-on time;
5 turning off the low speed fan when the intake manifold air
6 temperature is equal to or less than a predetermined low turn-off threshold
7 temperature for a predetermined low turn-off time, wherein the predetermined low
8 turn-on threshold temperature is greater than the predetermined low turn-off
9 threshold temperature;
10 turning on a high speed one of the at least one fans when the air inlet
11 temperature is equal to or greater than a predetermined high turn-on threshold
12 temperature for a predetermined high turn-on time; and
13 turning off the high speed fan when the intake manifold air
14 temperature is equal to or less than a predetermined high turn-off threshold
15 temperature for a predetermined high turn-off time, wherein the predetermined high
16 turn-on threshold temperature is greater than the predetermined high turn-off
17 threshold temperature and the predetermined high turn-on threshold temperature is
18 greater than the predetermined low turn-on threshold temperature.

1 10. The method of claim 9 further comprising transitioning off the
2 high speed fan when the intake manifold air temperature is equal to or less than the
3 predetermined high turn-off threshold temperature plus a low offset value for the
4 predetermined high turn-off time.

1 11. A system for controlling at least one cooling fan for a
2 compression ignition internal combustion engine, the system comprising:
3 at least one sensor for providing an indication of at least one engine
4 component parameter; and
5 an engine controller in communication with the at least one engine
6 component parameter sensor, the engine controller configured to,
7 turn on the at least one cooling fan when an intake manifold
8 air temperature is equal to or greater than a predetermined turn-on threshold
9 temperature for a predetermined turn-on time; and
10 turn off the at least one cooling fan when the intake manifold
11 air temperature is equal to or less than a predetermined turn-off threshold
12 temperature for a predetermined turn-off time, wherein the predetermined
13 turn-on threshold temperature is greater than the predetermined turn-off
14 threshold temperature.

1 12. The system of claim 11 wherein the controller is further
2 configured to determine the predetermined turn-on time and the predetermined turn-
3 off time via a look up table and in response to the intake manifold air temperature.

1 13. The system of claim 11 wherein the controller is further
2 configured to turn off the at least one cooling fan when an engine coolant
3 temperature is below a predetermined temperature.

1 14. The system of claim 13 wherein the controller is further
2 configured to turn off the at least one cooling fan when both of the intake manifold
3 air temperature and the engine coolant temperature are equal to or less than
4 respective predetermined temperatures when the intake manifold air and engine
5 coolant temperatures are independent of one another.

1 15. The system of claim 14 wherein the controller is further
2 configured to turning on the at least one cooling fan when a final torque generated
3 by the engine is equal to or greater than a predetermined value.

1 16. The system of claim 11 wherein the controller is further
2 configured to delay turning on the at least one fan when the engine is attempting to
3 start or within 5 seconds after starting.

1 17. The system of claim 11 wherein the controller is further
2 configured to determine the predetermined turn-on time and the predetermined turn-
3 off time using a counter.

1 18. The system of claim 11 wherein the controller is further
2 configured to turn on the at least one fan when there is a fault in at least one sensor
3 related to determination of the intake manifold air temperature.

1 19. The system of claim 11 wherein the controller is further
2 configured to:
3 turn on a low speed one of the at least one fans when the air inlet
4 temperature is equal to or greater than a predetermined low turn-on threshold
5 temperature for a predetermined low turn-on time;
6 turn off the low speed fan when the intake manifold air temperature
7 is equal to or less than a predetermined low turn-off threshold temperature for a
8 predetermined low turn-off time, wherein the predetermined low turn-on threshold
9 temperature is greater than the predetermined low turn-off threshold temperature;
10 turn on a high speed one of the at least one fans when the air inlet
11 temperature is equal to or greater than a predetermined high turn-on threshold
12 temperature for a predetermined high turn-on time; and
13 turn off the high speed fan when the intake manifold air temperature
14 is equal to or less than a predetermined high turn-off threshold temperature for a
15 predetermined high turn-off time, wherein the predetermined high turn-on threshold
16 temperature is greater than the predetermined high turn-off threshold temperature
17 and the predetermined high turn-on threshold temperature is greater than the
18 predetermined low turn-on threshold temperature.

1 20. The system of claim 11 wherein the controller is further
2 configured to transition off the high speed fan when the intake manifold air

- 3 temperature is equal to or less than the predetermined high turn-off threshold
- 4 temperature plus a low offset value for the predetermined high turn-off time.